User Interfaces and Industrial IoT, Hands-On

Class 1: An Overview of IIoT Applications and Interface Needs

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Presented by:

This Week's Agenda

2/26 An Overview of IIoT Applications and Interface Needs

2/27 Simple Interfaces that Aren't So Simple

2/28 Beginning Graphics Interface, Hands-on (Part 1)

3/1 Beginning Graphics Interface, Hands-on (Part 2)

3/2 Advanced Human Interface design for the IIoT

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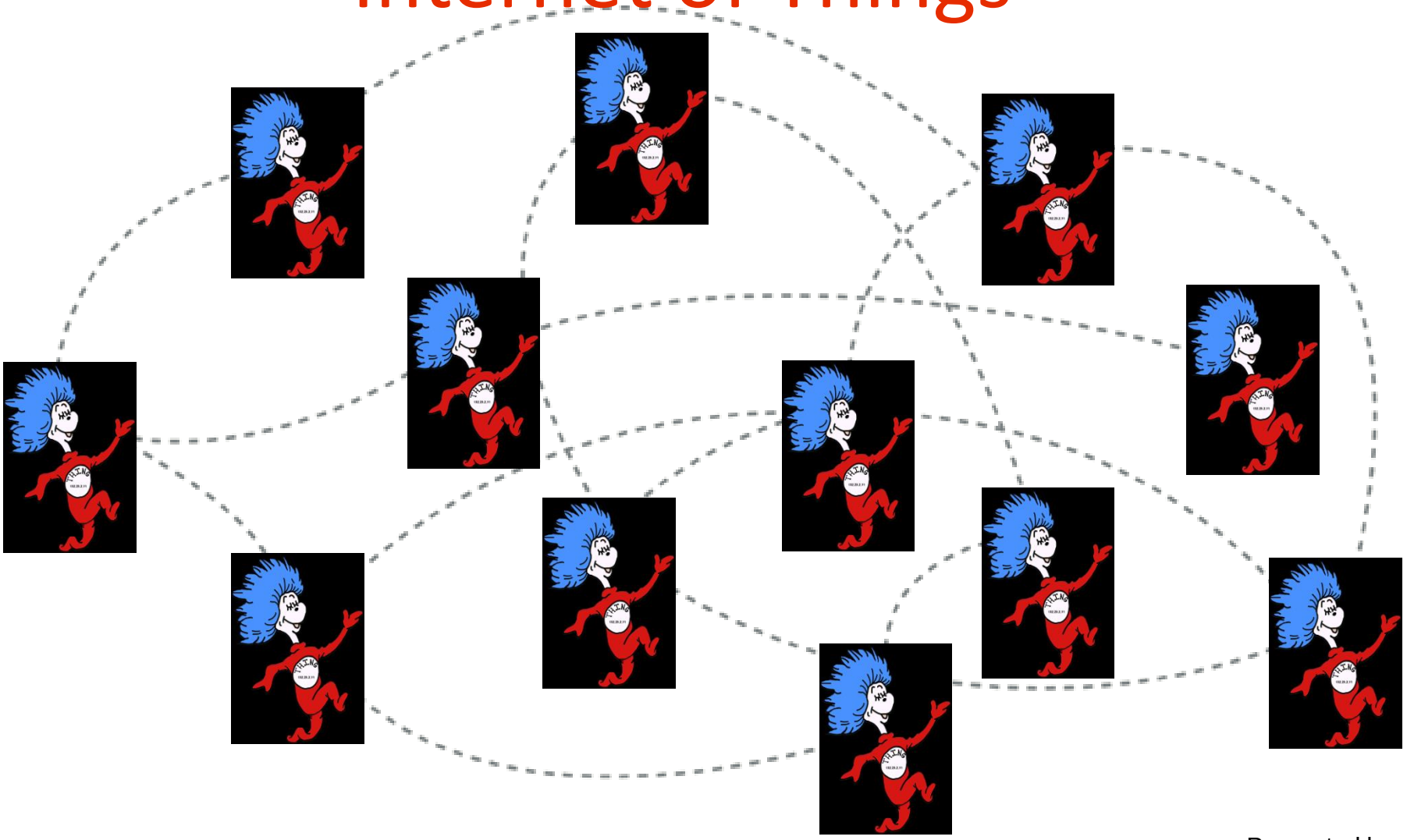
Internet of Things



So, What is the INDUSTRIAL IoT?

- The IoT is now being thought of as two types of network, coined the Human IoT and the Industrial IoT
- The “Human IoT” is characterized as having human interaction and low failure impact.
- The “Industrial IoT” is characterized as operating without direct human interaction and oversight, sometimes with potential catastrophic failure impact.

IIoT User Interface

Question 1 – Are you currently developing GUI for a product?

Human IoT (HIoT)

- Human-controlled or at least monitored
- Can include a person using a device (phone, tablet, computer, etc.
- Includes most consumer and wellness devices, although there is crossover. For example:
  - If your connected home thermostat fails, in most cases you will detect this and it becomes a nuisance issue
  - A thermostat in an unoccupied dwelling, or in an industrial process, or in an area that must be kept at a certain temperature range for safety can cause a catastrophic failure

IoT (Consumer) Examples

Industrial IoT (IIoT)

- Primarily devices that work with one another without human interaction or intervention (M2M)
- Robustness, controlled failure modes, security become primary issues
- “Consumer” items can quickly cross over, as a phone app can control your home or even your car. Or monitor life-critical health issues.

Main Markets

- Building Automation
- Industrial Automation
- Lighting
- Commercial Transportation / Fleet Mgmt
- Enterprise Asset Management
- Smart Cars
- Test and Measurement
- Energy Grid (Smart Grid)

Autonomous Control

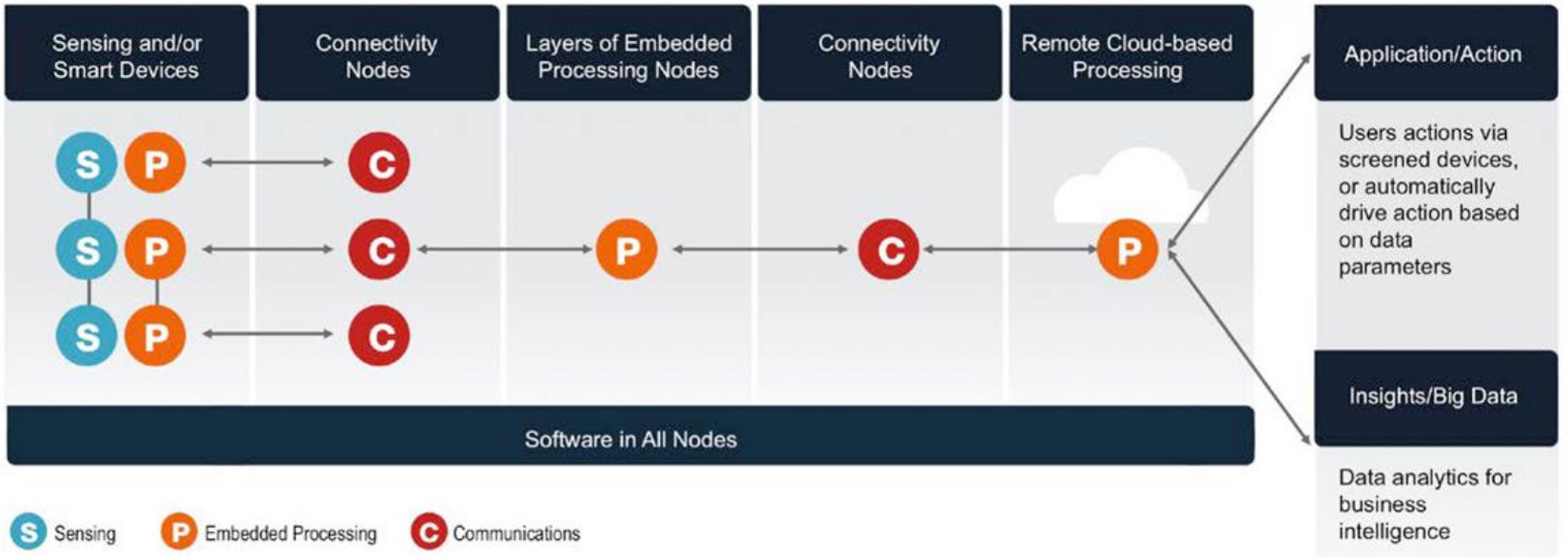
- Humans can be out of the loop
- Peer-to-peer
- Speed
- Environment

Reliability

- Failure can be catastrophic
- Known failure modes or “fail-safe”
- Toyota gas pedal

- So, how does reliability enter into our HMI design?

Three Major Areas of Development



Talk to the Things

- Many of the characteristics of IIoT affect the needs for HMI (Human-Machine Interface)
- A thing – or node – may have complex and critical HMI needs
- Most will need some form of local power and test interface at a minimum
- We will look at some application areas and some representative needs

What Kinds of Inputs / Outputs?

Inputs

- Mechanical Buttons
- Touch buttons / sliders
- Touch overlays
  - Capacitive
  - Resistive

Outputs

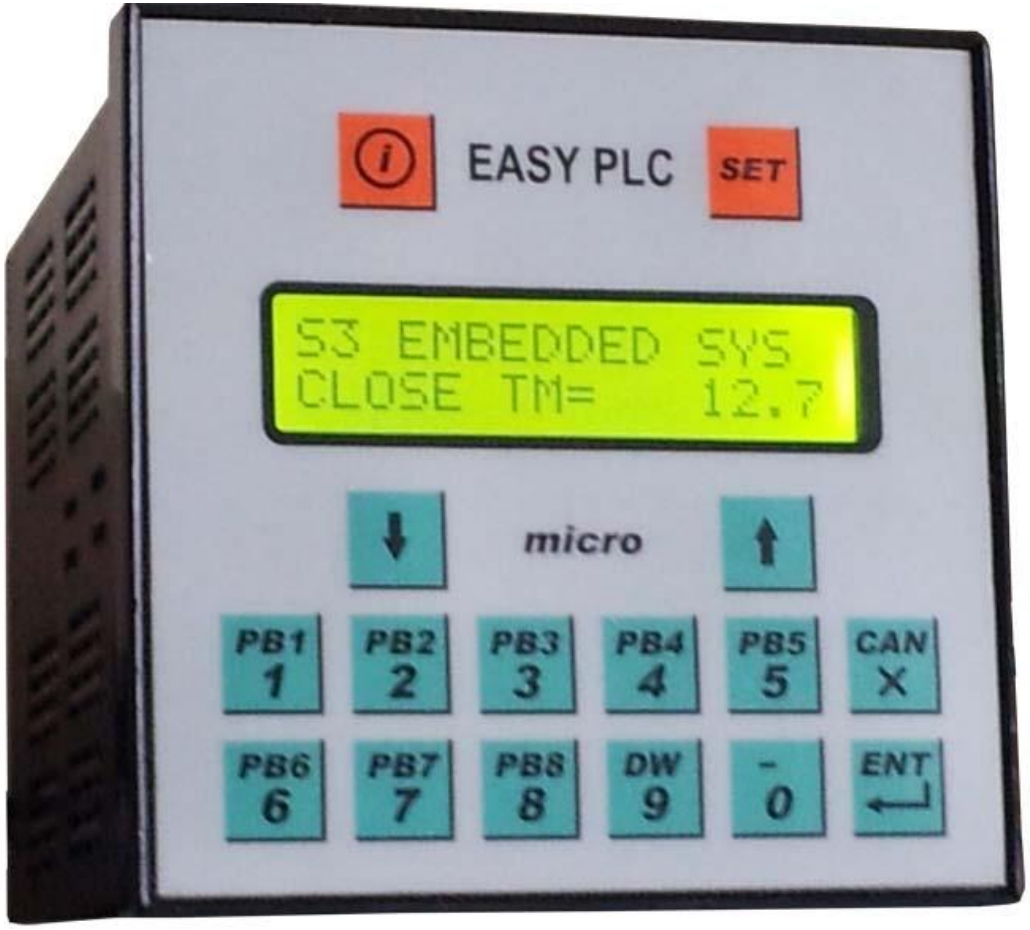
- LEDs
- Segmented LED
- Segmented LCD
- Custom segmented LCD
- Graphical LCD

Question 2 – What other HMI can you think of?

Buttons and LEDs

- Simplest of HMI
- Can still have reliability issues
- More tomorrow

Simple PLC


EASY PLC
SET
53 EMBEDDED SYS
CLOSE TM= 12.7
micro
PB1 1
PB2 2
PB3 3
PB4 4
PB5 5
CAN X
PB6 6
PB7 7
PB8 8
DW 9
- 0
ENT

Graphical LCD with Touch

- Both examples are automotive (Uconnect 5 and 8.4)

Tomorrow

- We will look at the different types of inputs we can use and some of the tradeoffs involved
- We will also look at segment LED displays

Question 3 – Will you be working with TouchGFX with this class?

Programming Note!

- Due to a change in the Draupner TouchGFX program, we will not be using MCUXpresso but will be using the 30-day free full IAR 8.2
- If you want to be downloading ahead of time, you can begin the signup and download of ToucgGFX 4.9.3 and IAR EWARM 8.2
- We will go over the details of the downloads tomorrow and will start using them Wednesday.

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Please stick around as I answer your questions!

- Please give me a moment to scroll back through the chat window to find your questions
- I will stay on chat as long as it takes to answer!
- I am available to answer simple questions or to consult (or offer in-house training for your company)
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